

# Refractories for cement industry

Products and applications

# Refrattari per l'industria del cemento

Prodotti ed applicazioni

**linco baxo** group of companies



2009 1st issue



**Refractories**

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## RANGE OF PRODUCTS FOR CEMENT INDUSTRY

### GAMMA PRODOTTI PER INDUSTRIA DEL CEMENTO



LINCO BAXO industrie refrattari - Bondeno Plant

| <b>BRANDNAME</b>                              | <b>DESCRIPTION</b>                                                                                    | <b>PAGE</b> |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------|-------------|
| LICOFEST<br>BAXOVIBRO<br>KEROFLOW<br>LICOCLAY | Unshaped refractories (castables & mouldables)<br><br>Refrattari monolitici (calcestruzzi & plastici) | 4-5         |
| MAREF<br>CARBO<br>ISOM                        | Refractory / insulating bricks and shapes<br><br>Mattoni / sagomati refrattari ed isolanti            | 6           |
| LM FIBRES<br>SILTHERM<br>BASALAN<br>PARGAS    | Ceramic & soluble fibres, insulating boards<br>Fibre ceramiche & solubili, pannelli isolanti          | 7           |
| MAREF                                         | Bricks shapes for cement kiln<br>Mattoni per forno da cemento                                         | 8-9         |
|                                               | Metallic and ceramic anchors<br>Ancoraggi metallici e ceramici                                        | 10          |
|                                               | Applications<br>Applicazioni                                                                          | 11-15       |

The informations provided in this leaflet are based on the results of routine production tests; as such are subject to slight variations and therefore should not be used as a specification. The figures are correct at the time of publishing (June 2009). Variations to standard products may cause deviations from the figures in this catalogue (June 2009).



LINCO BAXO industrie refrattari - Levate Plant

REFRACTORY CASTABLES & MOULDABLES

CALCESTRUZZI REFRATTARI & PLASTICI

|                                     | Brandname              | Chemical Analysis                |                                  |                    | Classification temperature | BD                | CCS 1300 °C       |
|-------------------------------------|------------------------|----------------------------------|----------------------------------|--------------------|----------------------------|-------------------|-------------------|
|                                     |                        | Al <sub>2</sub> O <sub>3</sub> % | Fe <sub>2</sub> O <sub>3</sub> % | SiO <sub>2</sub> % | °C                         | kg/m <sup>3</sup> | N/mm <sup>2</sup> |
| DENSE CASTABLES                     | LICOFEST 28            | 47                               | 1,5                              | 44                 | 1450                       | 2000              | 40                |
|                                     | LICOFEST 37            | 66                               | 0,9                              | 27                 | 1600                       | 2290              | 40                |
|                                     | LICOFEST 1600 0-10 QH  | 87                               | 0,8                              | 27                 | 1600                       | 2350              | 50                |
|                                     | LICOFEST H 82          | 86                               | 1                                | 6                  | 1700                       | 2650              | 40                |
|                                     | LICOFEST KOR 94        | 94                               | 0,4                              | 0,5                | 1730                       | 2960              | >130              |
|                                     | LICOFEST 42            | 96                               | 0,1                              | 0,1                | 1800                       | 2750              | 50                |
|                                     | LICOFEST H 95          | 95                               | 0,1                              | 0,2                | 1750                       | 2790              | 65                |
| LC CASTABLES                        | LICOFEST PL 320        | 51                               | 0,8                              | 45                 | 1500                       | 2150              | 70                |
|                                     | BAXOVIBRO VT 336       | 58                               | 1                                | 36                 | 1600                       | 2485              | 90                |
|                                     | BAXOVIBRO LB           | 65                               | 0,5                              | 31                 | 1650                       | 2490              | 70                |
|                                     | BAXOVIBRO VT 820       | 83                               | 0,8                              | 9                  | 1700                       | 2800              | >120              |
|                                     | BAXOVIBRO VT 1750      | 84                               | 1,5                              | 11                 | 1750                       | 2830              | >120              |
|                                     | BAXOVIBRO VT 95 TAB    | 95                               | 0,2                              | 3                  | 1800                       | 3000              | >130              |
| CASTABLES BASED ON ZrO <sub>2</sub> | BAXOVIBRO VT ZMX SUPER | 54                               | 26 (ZrO <sub>2</sub> )           | 16                 | 1670                       | 3000              | 160               |
|                                     | LICOFEST PL ZM X       | 56                               | 27 (ZrO <sub>2</sub> )           | 12                 | 1670                       | 2740              | 90                |
|                                     | LICOFEST PL Z4         | 50                               | 30 (ZrO <sub>2</sub> )           | 16                 | 1670                       | 3150              | 140               |
| LC CASTABLES BASED ON SiC           | BAXOVIBRO LB SiC       | 60                               | 5 (SiC)                          | 31                 | 1650                       | 2500              | 80                |
|                                     | BAXOVIBRO LB SiC 10    | 56                               | 10 (SiC)                         | 30                 | 1650                       | 2565              | 80                |
|                                     | BAXOVIBRO VT 35 SiC    | 35                               | 34 (SiC)                         | 28                 | 1600                       | 2510              | 95                |
|                                     | LICOFEST SiC 60 CL     | 32,5                             | 59 (SiC)                         | 6                  | 1600                       | 2510              | 125               |
|                                     | LICOFEST SiC 70 CL     | 11,5                             | 70 (SiC)                         | 14                 | 1600                       | 2550              | 128               |
|                                     | LICOFEST SiC 85 CL     | 8                                | 84 (SiC)                         | 5                  | 1600                       | 2560              | 85                |
| SELF-FLOWING MIXES                  | KEROFLOW SiC 60        | 38                               | 55 (SiC)                         | 5                  | 1500                       | 2500              | 80                |
|                                     | KEROFLOW SiC 35        | 48                               | 35 (SiC)                         | 15                 | 1500                       | 2400              | 80                |
|                                     | LICOFEST ZR 291 SF     | 71                               | 10 (ZrO <sub>2</sub> )           | 14                 | 1650                       | 2850              | 90                |
|                                     | LICOFEST 791 SF        | 80                               | 1                                | 14                 | 1650                       | 2850              | 90                |
|                                     | KEROFLOW B 06/6        | 90                               | 0,8                              | 3                  | 1650                       | 3010              | 120               |
|                                     | KEROFLOW T 04/7        | 97                               | 0,04                             | 0,08               | 1800                       | 3185              | 130               |
| PLASTIC MOULDABLES                  | LICOCLAY X 36          | 52                               | 1                                | 44                 | 1600                       | 2350              | 40                |
|                                     | LICOCLAY X 37          | 60                               | 1                                | 38                 | 1650                       | 2450              | 45                |
|                                     | LICOCLAY X 39          | 81                               | 1,3                              | 14                 | 1720                       | 2650              | 60                |
|                                     | LICOCLAY X 41          | 86                               | 0,9                              | 10                 | 1750                       | 2800              | 45                |
|                                     | LICOCLAY X 415         | 90                               | 0,4                              | 10                 | 1800                       | 2900              | 75                |



|                               | Brandname            | Chemical Analysis                |                                  |                        | Classification temperature | BD                | CCS  |                   |
|-------------------------------|----------------------|----------------------------------|----------------------------------|------------------------|----------------------------|-------------------|------|-------------------|
|                               |                      | Al <sub>2</sub> O <sub>3</sub> % | Fe <sub>2</sub> O <sub>3</sub> % | SiO <sub>2</sub> %     | °C                         | kg/m <sup>3</sup> | °C   | N/mm <sup>2</sup> |
| GUNNING CASTABLES             | LICOFEST 32 G TR     | 52                               | 0,8                              | 39                     | 1520                       | 2060              | 1300 | 50                |
|                               | LICOFEST 33 G TR     | 57                               | 0,8                              | 33                     | 1550                       | 2080              |      | 55                |
|                               | LICOFEST AT 65       | 66                               | 0,9                              | 26                     | 1600                       | 2320              |      | 55                |
|                               | LINAX 70             | 71                               | 1,3                              | 22                     | 1600                       | 2160              |      | 18                |
| GUNNING CASTABLE BASED ON SiC | LICOFEST 33 G SiC    | 56                               | 6 (SiC)                          | 29                     | 1550                       | 2350              | 1300 | 65                |
|                               | LICOFEST SiC V 30 TR | 40                               | 30 (SiC)                         | 25                     | 1400                       | 2150              |      | 48                |
|                               | LICOFEST SiC V 60 TR | 26                               | 60 (SiC)                         | 8                      | 1400                       | 2300              |      | 45                |
|                               | LICOFEST Z SiC TR    | 52                               | 10 (SiC)                         | 10 (ZrO <sub>2</sub> ) | 1580                       | 2520              |      | 70                |
|                               | LICOFEST Z G TR      | 50                               | 0,5                              | 27 (ZrO <sub>2</sub> ) | 1580                       | 2800              |      | 50                |
| LW-CASTABLES                  | LICOFEST 5V          | 31                               | 10                               | 32                     | 1000                       | 535               | 815  | 0,7               |
|                               | LICOFEST L 09        | 29                               | 9                                | 44                     | 1100                       | 935               | 815  | 2,5               |
|                               | LICOFEST LW 203 CH   | 40                               | 6                                | 36                     | 1320                       | 1215              | 815  | 6                 |
|                               | LICOFEST PC 14 HT    | 40                               | 6                                | 38                     | 1370                       | 1410              | 815  | 11                |
|                               | LICOFEST FL 60       | 59                               | 1,5                              | 33                     | 1580                       | 1500              | 1300 | 13                |
| COATING                       | BAXOCOAT Z           | 60 (ZrO <sub>2</sub> )           | 0,3                              | 30                     | 1650                       | 3000              | -    | -                 |
|                               | BAXOCOAT SiC         | 5                                | 0,9                              | 85 (SiC)               | 1650                       | 2500              | -    | -                 |

#### ALCALI: IL NEMICO N.1 NEI FORNI DA CEMENTERIA

Nei forni da cementeria uno dei problemi maggiori è la corrosione e l'incrostazione dei refrattari dovuta agli alcali.

Il fenomeno è il seguente: gli alcali come K<sub>2</sub>O (ossido di potassio) e Na<sub>2</sub>O (ossido di sodio) provenienti dalla materia prima in ingresso, reagiscono con le varie tipologie di combustibili attualmente in uso formando nuovi componenti quali K<sub>2</sub>SO<sub>4</sub> (solfato di potassio) e KCl (cloruro di potassio).

Nelle zone statiche inferiori, quali testata e raffreddatore, tali componenti penetrano il refrattario e in temperatura (tra 800 °C e 900 °C) condensano, reagiscono con Al<sub>2</sub>O<sub>3</sub> e SiO<sub>2</sub> formando nuovi componenti bassofondenti che tendono a gonfiarsi/ingrandirsi, anche fino al 50%.

Tale fenomeno porta a parziale caduta di lastre/blocchi dalla muratura refrattaria ("spalling").

Nelle zone statiche "superiori" quali la torre, il calcinatore, la camera di transizione (zona ingresso forno) gli alcali formano invece una superficie molto viscosa, quindi appiccicosa, sulla quale si depositano e attecchiscono alcali, polveri e parti fini della materia prima in ingresso nel forno, formando grossi aggrappi "build-up"; tali incrostazioni sono molto difficili da eliminare e di fatto rallentano o impediscono la produzione.

Al fine di eliminare questi "build-up" diventa quindi necessario intervenire con lance ad altissima pressione, assieme all'uso di air-shock "blower", danneggiando il più delle volte anche il refrattario sottostante.

Per superare questo problema **Linco Baxo** ha sviluppato una vasta gamma di materiali a bassa porosità a base di SiC o ZrO<sub>2</sub>. Tali materiali sono caratterizzati da ottima resistenza all'attacco degli alcali, eccellenti resistenze all'abrasione e meccaniche. In temperatura questi prodotti, per reazione chimica formano una struttura vetrosa chiudendo tutte le porosità e impedendo l'attacco degli alcali; se comunque ciò accadesse l'eventuale reazione fra fase vetrosa e alcali, non porterebbe al rigonfiamento o al build-up.

Di fatto gli alcali non penetrando nel rivestimento refrattario tendono a crollare sotto l'effetto del proprio peso. Il rivestimento refrattario non è quindi danneggiabile. I nostri materiali sono stati utilizzati con successo in impianti in cui gli alcali rappresentavano un grave problema. I build-up sono stati eliminati e le operazioni sono migliorate.

**Linco Baxo** è in grado di offrire ai propri clienti una gamma completa di prodotti, con un SiC o ZrO<sub>2</sub> con contenuto che varia dal 5% al 85%, a bassa porosità e specifici per resistere all'attacco degli alcali. La corretta scelta del materiale da utilizzare dipende dalle condizioni di esercizio dell'impianto che sappiamo variare da forno a forno.

#### ALKALI: ENEMY No 1 OF CEMENT KILNS

One of main the problems in cement kilns is the build-up and corrosion of refractories caused by alkali.

The reaction is as follows: Alkali such as K<sub>2</sub>O (potassium oxide) and Na<sub>2</sub>O (sodium oxide), which are introduced to the kiln by the raw materials, react with the different types of fuels which are used in producing new elements, such as K<sub>2</sub>SO<sub>4</sub> (potassium sulphate) and KCl (potassium chloride).

In lower static units (firing hood, cooler, etc.) these alkali penetrate the refractories at high temperatures (varying between 800 and 900 degrees), condense, and react with Al<sub>2</sub>O<sub>3</sub> and SiO<sub>2</sub>, forming new phases with low melting points. This leads to swelling of up to 50% and subsequently to deformation/spalling of the refractories.

In upper static units, the reaction leads to the formation of a gluey surface, on which alkali, dust and fine particles of the raw material will deposit and attach, forming huge build-ups. These build-ups are very difficult to eliminate and they may slow down or prevent production.

In order to get rid of these build-ups it is then necessary to intervene with high pressure lances and shock blowers, often damaging the refractories underneath.

To overcome this problem, **Linco Baxo** has developed a range of low porosity castables, based on SiC or ZrO<sub>2</sub>. These materials demonstrate excellent resistance to alkali salts and coating build-up. The principle is that the chemical reaction of SiC / ZrO<sub>2</sub> based castables, which takes place in temperature, forms a glass-phase on the surface which plugs into all open porosity and prevents swelling and build-up.

Since the alkali do not penetrate the refractory lining they will fall under their own weight, preventing damage to the refractory lining

Our materials have been used successfully in cement plants where alkali had been a serious problem. After applying our materials the build-ups were eliminated and the operations were improved.

**Linco Baxo** can offer their clients a comprehensive range of products, with an SiC / ZrO<sub>2</sub> content that varies from 5% to 85%, exhibiting very low porosity and tailored to withstand alkali corrosion. The correct choice of product depends on the working conditions of each kiln.

# REFRACTORY BRICKS AND SHAPES

## MATTONI E SAGOMATI REFRATTARI

|                      | Brandname      | Refractoriness<br>°C | Chemical Analysis                |                    |                                           | Bulk density<br>Kg/m <sup>3</sup> | CCS<br>N/mm <sup>2</sup> | Main raw material          |
|----------------------|----------------|----------------------|----------------------------------|--------------------|-------------------------------------------|-----------------------------------|--------------------------|----------------------------|
|                      |                |                      | Al <sub>2</sub> O <sub>3</sub> % | SiO <sub>2</sub> % | Fe <sub>2</sub> O <sub>3</sub>            |                                   |                          |                            |
| SILICO<br>ALLUMINOSI | MAREF 32 AK    | 1660                 | 32                               | 61                 | 1,5                                       | 2150                              | 50                       | chamotte                   |
|                      | MAREF 34C      | 1690                 | 34                               | 60                 | 2,00                                      | 2150                              | 50                       | chamotte                   |
|                      | MAREF 42C      | 1730                 | 41                               | 56                 | 1,60                                      | 2300                              | 50                       | chamotte                   |
|                      | MAREF 44C      | 1760                 | 44                               | 46                 | 1,50                                      | 2300                              | 50                       | chamotte                   |
|                      | MAREF 45Y      | 1745                 | 43                               | 52                 | 1,40                                      | 2300                              | 50                       | premium grade<br>fire clay |
| ALUMINA<br><br>HIGH  | MAREF 52C      | 1780                 | 52                               | 43                 | 1,60                                      | 2400                              | 50                       | chamotte/bauxite           |
|                      | MAREF 60 CL    | 1790                 | 62                               | 30                 | 1,80                                      | 2400                              | 45                       | bauxite                    |
|                      | MAREF 62 C     | 1830                 | 62                               | 34                 | 1,50                                      | 2350                              | 50                       | chamotte/bauxite           |
|                      | MAREF 65Y      | 1830                 | 62                               | 34                 | 1,50                                      | 2400                              | 50                       | chamotte/bauxite           |
|                      | MAREF 72C      | 1855                 | 72                               | 24                 | 1,50                                      | 2550                              | 60                       | chamotte/bauxite           |
|                      | MAREF 80C      | 1860                 | 80                               |                    | 1,50                                      | 2800                              | 75                       | chamotte/bauxite           |
|                      | MAREF 85Y      | 1860                 | 81                               | 13                 | 1,5                                       | 2750                              | 70                       | bauxite                    |
|                      | MAREF 80 CB    | 1890                 | 81                               | 14                 | 1,50                                      | 2900                              | 80                       | bauxite                    |
|                      | MAREF 90 CB    | 1920                 | 88                               | 6                  | 1,30                                      | 2950                              | 90                       | bauxite/corundum           |
|                      | MAREF 95 AT    | 2000                 | 92                               | 7                  | 0,2                                       | 2900                              | 100                      | tabular alumina            |
| SIC                  | CARBO A 5      | 1830                 | 37                               | 51<br>(SiC)        | 0,6                                       | 2350                              | 55                       | silicon carbide            |
|                      | CARBO 75       | 1880                 | 18                               | 75<br>(SiC)        | 0,6                                       | 2500                              | 50                       | silicon carbide            |
|                      | CARBO 90 HD    | 1880                 | 8                                | 85<br>(SiC)        | 0,5                                       | 2600                              | 85                       | silicon carbide            |
| MAGNESITE            | MAREF MC3      | 1770                 | 3,7                              | 76,8<br>(MgO)      | 8,6<br>(Cr <sub>2</sub> O <sub>3</sub> )  | 2900                              | 50                       | cromo-magnesite            |
|                      | MAREF MC6      | 1800                 | 4,3                              | 82,9<br>(MgO)      | 5,00<br>(Cr <sub>2</sub> O <sub>3</sub> ) | 2900                              | 60                       | cromo-magnesite            |
|                      | MAREF PERMAL 3 | 1800                 | 6,1                              | 88,9<br>(MgO)      | 1,9                                       | 2860                              | 65                       | magnesite                  |
|                      | MAREF PERMAL7  | 1780                 | 8                                | 87,3<br>(MgO)      | 2                                         | 2850                              | 70                       | magnesite                  |

A complete group of shaped refractories manufactured in standard sizes and itemized shapes

## INSULATING BRICKS

## INSULATING BRICKS

|                      | Brandname | Bulk density<br>Kg/m <sup>3</sup> | Standard |         | Classification temperature | Al <sub>2</sub> O <sub>3</sub><br>% | Fe <sub>2</sub> O <sub>3</sub><br>% |
|----------------------|-----------|-----------------------------------|----------|---------|----------------------------|-------------------------------------|-------------------------------------|
|                      |           |                                   | ASTM     | ISO     |                            |                                     |                                     |
| INSULATING<br>BRICKS | ISOM 23A  | 560                               | 23       | 125.06L | 1260                       | 38                                  | 1                                   |
|                      | ISOM 26   | 800                               | 26       | 140.08L | 1430                       | 58                                  | 0,9                                 |
|                      | ISOM 28   | 900                               | 28       | 150.09L | 1540                       | 65                                  | 0,7                                 |
|                      | ISOM 30   | 1050                              | 30       | 160.10L | 1650                       | 73                                  | 0,5                                 |

# CERAMIC & SOLUBLE FIBRES

## FIBRE CERAMICHE E SOLUBILI

|                | Brandname    | Description               | Classification Temperature<br>°C | BD<br>Kg/m <sup>3</sup> | Dimensions<br>mm                         |                                            |
|----------------|--------------|---------------------------|----------------------------------|-------------------------|------------------------------------------|--------------------------------------------|
| CERAMIC FIBRES | LM 1260      | Rolls                     | 1260                             | 96-128-160              | 7320x610x6<br>7320x610x19<br>4880x610x38 | 14640x610x13<br>7320x610x25<br>3660x610x50 |
|                | LM 1430      | Rolls                     | 1430                             | 96-128-160              |                                          |                                            |
|                | LF 1260      | Wool                      | 1260                             |                         | In bags                                  |                                            |
|                | LF 1450      | Wool                      | 1450                             |                         |                                          |                                            |
|                | LF 1600      | Wool                      | 1600                             |                         |                                          |                                            |
|                | LV 12        | Boards                    | 1260                             | 300                     | 1200x1000x10-100                         |                                            |
|                | LV 14        | Boards                    | 1430                             | 310                     |                                          |                                            |
|                | LP 1260      | Paper                     | 1260                             | 200                     | Thickness 1/2/3/4/5                      |                                            |
|                | LP 1400      | Paper                     | 1400                             | 210                     |                                          |                                            |
|                | L MOD 12     | Modules                   | 1260                             | 160-220                 | 300x300x50-100<br>other sizes on request |                                            |
|                | L MOD 14     | Modules                   | 1450                             |                         |                                          |                                            |
|                | L MOD 16     | Modules                   | 1600                             |                         |                                          |                                            |
|                | A365/A366    | Steel anchors<br>(4841)   | 1150                             |                         | on request                               |                                            |
|                | HT-ANKER     | Steel anchors<br>(Si3-N4) | 1800                             |                         | on request                               |                                            |
| SOLUBLE FIBRES | LM ECO 1200  | Rolls                     | 1100                             | 96-128-160              | 7320x610x6/19/25<br>4880x610x38          | 14640x610x13<br>3660x610x50                |
|                | LP ECO       | Paper                     | 1100                             | 210                     | Thickness 1/2/3/4/5                      |                                            |
|                | LV ECO       | Boards                    | 1100                             | 350                     | 1200x1000x10-100                         |                                            |
|                | LF ECO       | Wool                      | 1100                             |                         | In bags                                  |                                            |
|                | L MOD ECO 12 | Modules                   | 1100                             | 128-200                 | 300x300x50-100<br>other sizes on request |                                            |



# INSULATING BOARDS

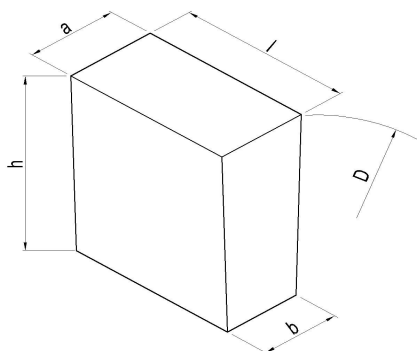
## PANNELLI ISOLANTI

|                    | Brandname     | Description             | Classification temperature<br>°C | BD<br>Kg/m <sup>3</sup> | Dimensions<br>mm |                |
|--------------------|---------------|-------------------------|----------------------------------|-------------------------|------------------|----------------|
| BACK-UP INSULATION | SILTHERM 1000 | Calcium silicate boards | 1000                             | 240                     | 1000x500x25-100  | 500x500x25-100 |
|                    | SILTHERM 1100 | Calcium silicate boards | 1100                             | 275                     | 1000x500x25-100  | 500x500x25-100 |
|                    | BASALAN       | Mineral wool boards     | 800                              | 120-140                 | 1000x600x25-100  |                |
|                    | PARGAS        | Mineral wool boards     | 900                              | 160-180                 | 1000x600x25-100  |                |
|                    | MICROPOR      | Microporous boards      | 950                              | 300                     | 1000x600x25-100  |                |



# BRICKS SHAPES FOR CEMENT KILN

## FORMATO DEI MATTONI PER FORNO DA CEMENTO



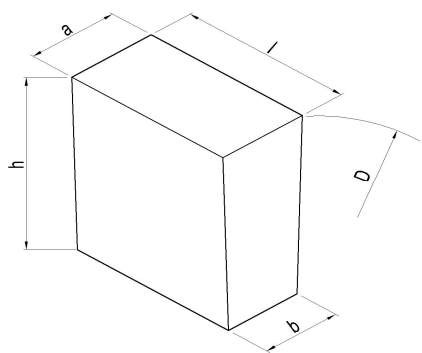
Unified shape with external conicity = 103 mm ( $\pi/3$ )  
 Formato unificato con conicità esterna = 103 ( $\pi/3$ )

| Code<br>Sigla | Dimensions/Dimensioni mm |      |     |     | Radius    | Diameter | Volume<br>dm <sup>3</sup> |
|---------------|--------------------------|------|-----|-----|-----------|----------|---------------------------|
|               | a                        | b    | h   | l   | D/2<br>mm | D<br>mm  |                           |
| 216           | 103                      | 86   | 160 | 198 | 986       | 1971     | 2,99                      |
| 316           |                          | 92   |     |     | 1523      | 3046     | 3,09                      |
| 416           |                          | 94,5 |     |     | 1970      | 3940     | 3,13                      |
| 516           |                          | 96,5 |     |     | 2577      | 5154     | 3,16                      |
| 218           | 103                      | 84   | 180 | 198 | 992       | 1984     | 3,33                      |
| 318           |                          | 90,5 |     |     | 1507      | 3014     | 3,45                      |
| 418           |                          | 93,5 |     |     | 1983      | 3966     | 3,5                       |
| 518           |                          | 95,5 |     |     | 2512      | 5024     | 3,54                      |
| 618           |                          | 97   |     |     | 3141      | 6282     | 3,56                      |
| 220           | 103                      | 82   | 200 | 198 | 997       | 1994     | 3,66                      |
| 320           |                          | 89   |     |     | 1496      | 2991     | 3,80                      |
| 420           |                          | 92,5 |     |     | 1994      | 3988     | 3,87                      |
| 520           |                          | 94,7 |     |     | 2523      | 5046     | 3,91                      |
| 620           |                          | 96,2 |     |     | 3080      | 6159     | 3,94                      |
| 720           |                          | 97   |     |     | 3490      | 6980     | 3,96                      |
| 820           |                          | 97,8 |     |     | 4025      | 8050     | 3,98                      |
| 322           | 103                      | 88   | 220 | 198 | 1536      | 3071     | 4,16                      |
| 422           |                          | 91,5 |     |     | 2003      | 4006     | 4,24                      |
| 522           |                          | 94   |     |     | 2560      | 5119     | 4,29                      |
| 622           |                          | 95,5 |     |     | 3075      | 6149     | 4,32                      |
| 722           |                          | 96,5 |     |     | 3523      | 7046     | 4,35                      |
| 822           |                          | 97,3 |     |     | 4041      | 8082     | 4,36                      |
| 425           | 103                      | 90   | 250 | 198 | 2014      | 4027     | 4,78                      |
| 525           |                          | 92,7 |     |     | 2541      | 5082     | 4,84                      |
| 625           |                          | 94,5 |     |     | 3079      | 6158     | 4,89                      |
| 725           |                          | 95,5 |     |     | 3490      | 6980     | 4,91                      |
| 825           |                          | 96,5 |     |     | 4026      | 8052     | 4,94                      |



# BRICKS SHAPES FOR CEMENT KILN

## FORMATO DEI MATTONI PER FORNO DA CEMENTO



Unified shape with average conicity = 71,5 mm (VDZ series)  
 Formato unificato con conicità media = 71,5 mm (serie VDZ)

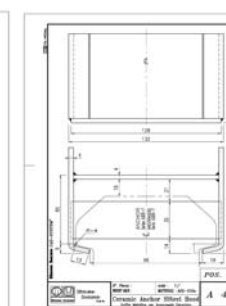
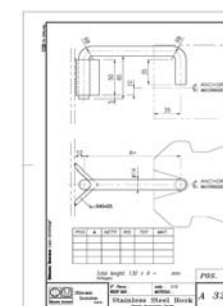
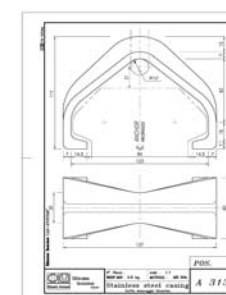
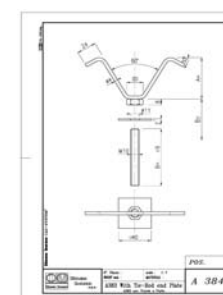
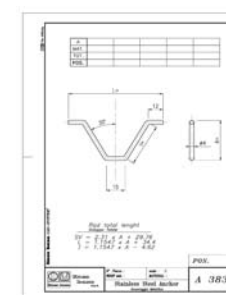
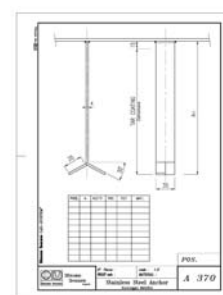
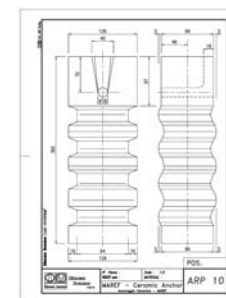
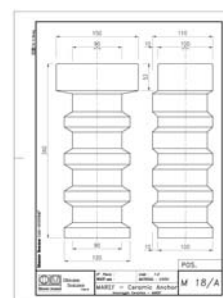
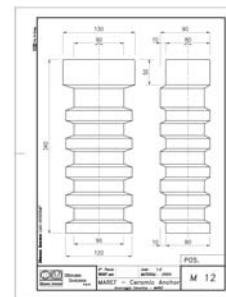
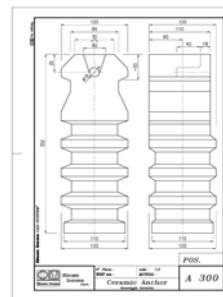
| Code<br>Sigla | Dimensions/Dimensioni mm |      |     |     | Radius<br>D/2<br>mm | Diameter<br>D<br>mm | Volume<br>dm <sup>3</sup> |
|---------------|--------------------------|------|-----|-----|---------------------|---------------------|---------------------------|
|               | a                        | b    | h   | l   |                     |                     |                           |
| B 216         | 78                       | 65   | 160 | 198 | 979                 | 1957                | 2.27                      |
| B 416         | 75                       | 68   |     |     | 1749                | 3497                |                           |
| B 218         | 78                       | 65   | 180 | 198 | 1101                | 2202                | 2.55                      |
| B 318         | 76.5                     | 66.5 |     |     | 1404                | 2808                |                           |
| B 418         | 75                       | 68   |     |     | 1967                | 3934                |                           |
| B 518         | 74.5                     | 68.5 |     |     | 2280                | 4560                |                           |
| B 618         | 74                       | 69   |     |     | 2718                | 5436                |                           |
| B 220         | 78                       | 65   | 200 | 198 | 1223                | 2446                | 2.83                      |
| B 320         | 76.5                     | 66.5 |     |     | 1560                | 3120                |                           |
| B 420         | 75                       | 68   |     |     | 2186                | 4371                |                           |
| B 520         | 74.5                     | 68.5 |     |     | 2534                | 5067                |                           |
| B 620         | 74                       | 69   |     |     | 3020                | 6040                |                           |
| B 222         | 78                       | 65   | 220 | 198 | 1345                | 2690                | 3.11                      |
| B 322         | 76.5                     | 66.5 |     |     | 1716                | 3432                |                           |
| B 422         | 75                       | 68   |     |     | 2404                | 4808                |                           |
| B 522         | 74.5                     | 68.5 |     |     | 2787                | 5574                |                           |
| B 622         | 74                       | 69   |     |     | 3322                | 6644                |                           |
| B 325         | 78                       | 65   | 250 | 198 | 1529                | 3058                | 3.54                      |
| B 425         | 76.5                     | 66.5 |     |     | 1950                | 3900                |                           |
| B 525         | 75                       | 68   |     |     | 2732                | 5464                |                           |
| B 625         | 74.5                     | 68.5 |     |     | 3167                | 6333                |                           |
| B 725         | 74                       | 69   |     |     | 3675                | 7350                |                           |

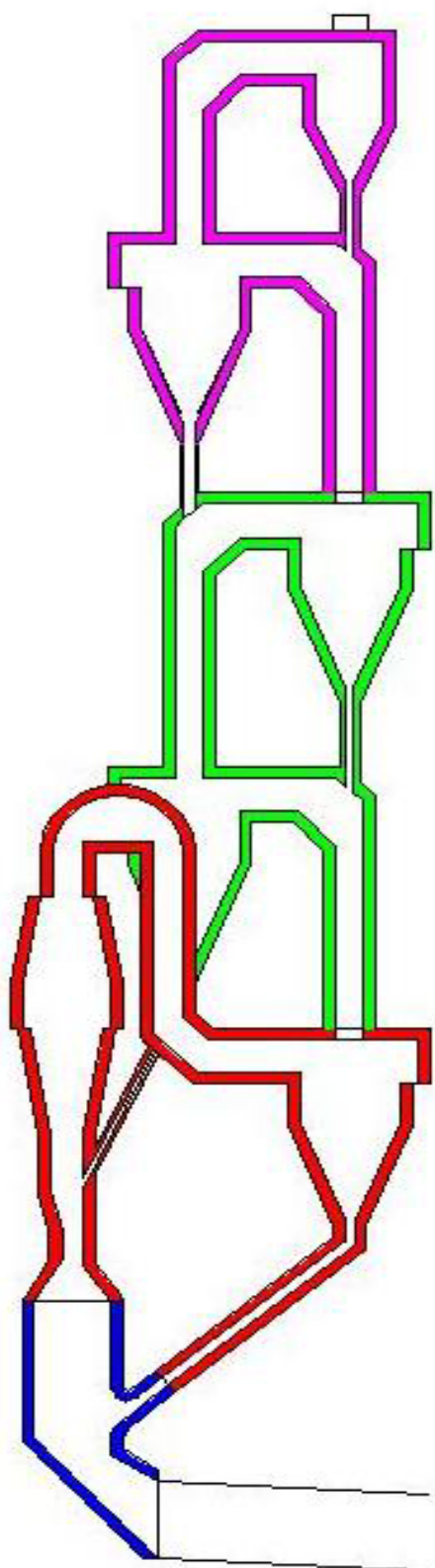
# METALLIC AND CERAMIC ANCHORS

## ANCORAGGI METALLICI E CERAMICI

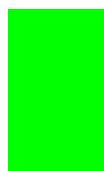
Siamo in grado di fornire un'ampia gamma di ancoraggi metallici e ceramici studiati appositamente per il rivestimento refrattario ed isolante di forni industriali. Questi prodotti possono anche essere realizzati su disegno del cliente e rispondono a tutte le esigenze offrendo una perfetta integrazione con la carpenteria del forno.

We offer a wide range of metallic and ceramic anchors tailored to insulating and refractory linings of industrial furnaces. In addition to standard products, we can supply items according to customer's drawings





LICOFEST 28  
LICOFEST 37  
LICOFEST 32 G TR  
MAREF 32 AK  
MAREF 34 C



LICOFEST PL 320  
BAXOVIBRO VT 336  
LICOFEST 32 G TR  
MAREF 32 AK  
MAREF 34 C



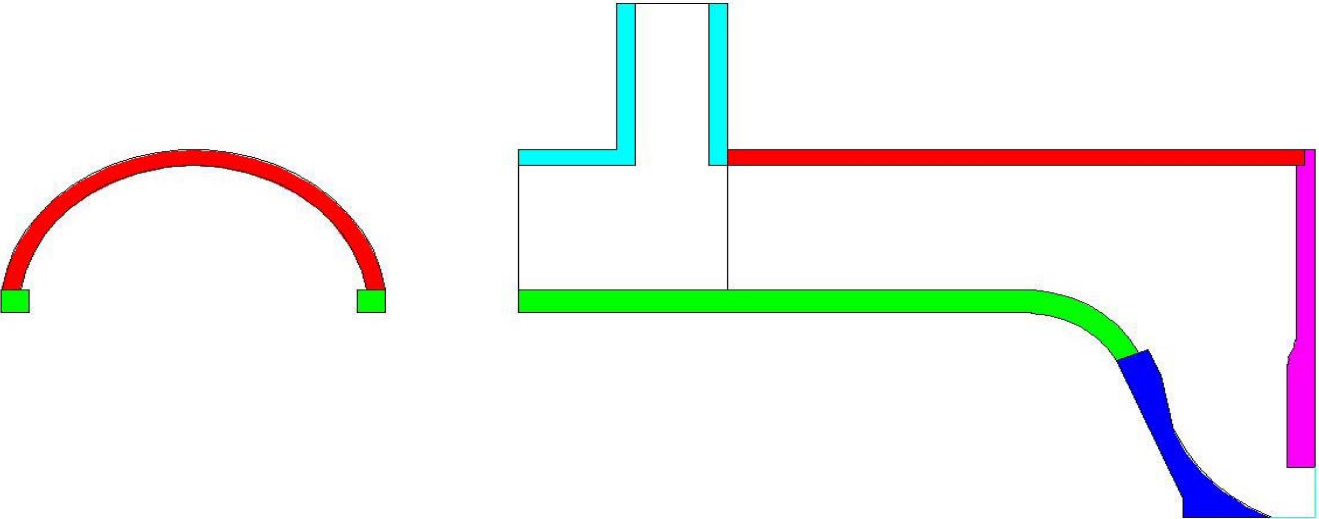
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BAXOVIBRO LB SIC  
BAXOVIBRO LB SIC 10  
BAXOVIBRO VT 35 SIC  
LICOFEST 33 G SIC  
LICOFEST 33 G TR  
LICOFEST SIC V 30 TR  
MAREF 42 C  
MAREF 44 C



LICOFEST SIC 60 CL  
BAXOVIBRO VT ZMX SUPER 0-10  
LICOFEST SIC V 30 TR  
LICOFEST SIC V 60 TR  
LICOFEST Z SIC TR  
MAREF CARBO A 5  
MAREF 80 C

HEAT EXCHANGER / GRATE PREATHER

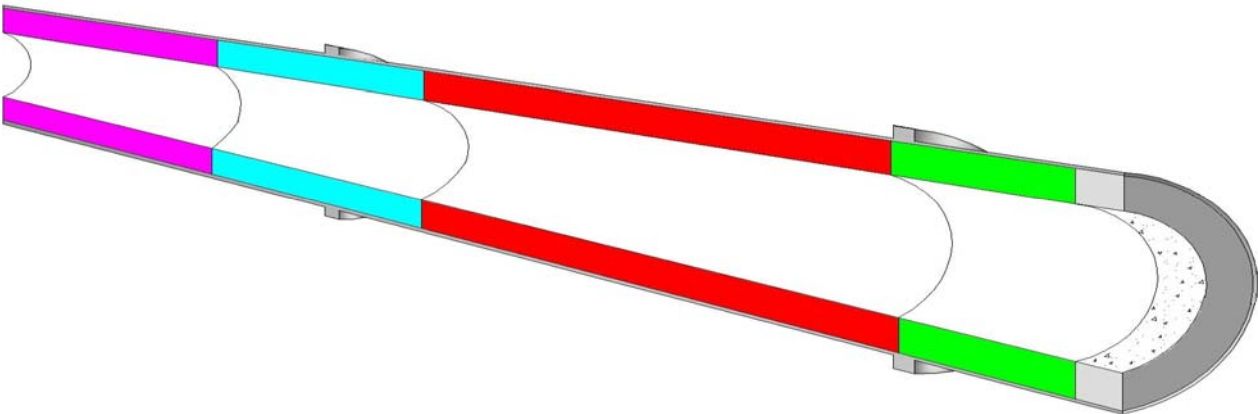
SCAMBIATORE DI CALORE / GRIGLIA LEPOL



|                                                                                                    |                                                                                                                                                                                                  |                                                                                                                             |
|----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <div></div> <div> LICOFE<b>S</b> 28<br/> LICOFE<b>S</b> 37<br/> MAREF 32 AK<br/> MAREF 34 C </div> | <div></div> <div> LICOFE<b>S</b> 37<br/> LICOFE<b>S</b> 1600 0-10 QH<br/> LICOFE<b>S</b> 32 G TR<br/> LICOFE<b>S</b> 33 G TR<br/> LICOFE<b>S</b> 33 G SIC<br/> MAREF 42 C<br/> MAREF 44 C </div> | <div></div> <div> BAXOVIBRO LB SIC<br/> BAXOVIBRO LB SIC 10<br/> LICOFE<b>S</b> 33 G TR<br/> LICOFE<b>S</b> 33 G SIC </div> |
| <div></div> <div> BAXOVIBRO VT 336<br/> BAXOVIBRO VT 820<br/> BAXOVIBRO VT 1750 </div>             |                                                                                                                                                                                                  | <div></div> <div> BAXOVIBRO VT 35 SIC<br/> LICOFE<b>S</b> SIC 60 CL<br/> BAXOVIBRO VT ZMX SUPER 0-10 </div>                 |

ROTARY KILN

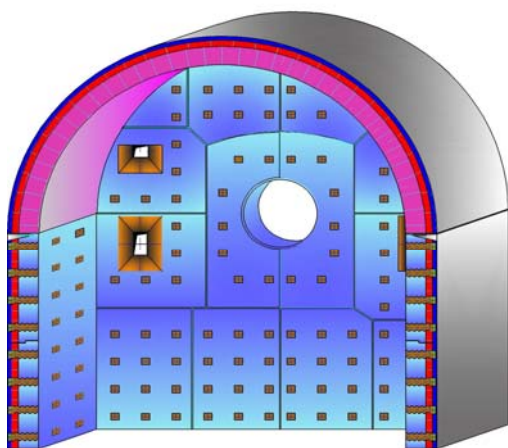
FORNO ROTANTE



|                                                                      |                                                                                             |                                                                                                |
|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| <div></div> <div> MAREF 32 AK<br/> MAREF 42 C<br/> MAREF 44 C </div> | <div></div> <div> MAREF MC 3<br/> MAREF MC 6<br/> MAREF PERMAL 3<br/> MAREF PERMAL 7 </div> | <div></div> <div> MAREF 80 C<br/> MAREF 80 CB<br/> MAREF 90 CB </div>                          |
| <div></div> <div> MAREF 62 C<br/> MAREF 72 C </div>                  |                                                                                             | <div></div> <div> LICOFE<b>S</b> KOR 94<br/> BAXOVIBRO VT 1750<br/> BAXOVIBRO TX 95 TAB </div> |

## FIRING HOOD

### TESTATA MOBILE

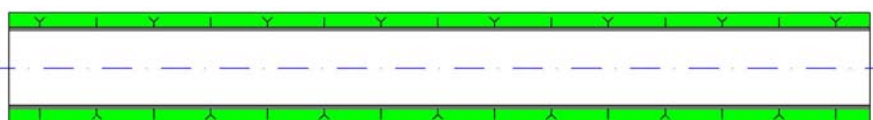


MAREF 62 C  
MAREF 72 C

LICOFEST 1600 0-10  
BAXOVIBRO LB  
BAXOVIBRO LB SIC  
BAXOVIBRO LB SIC 10  
LICOFEST 33 G TR  
LICOFEST AT 65  
LICOFEST 33 G SIC

## BURNER LANCE

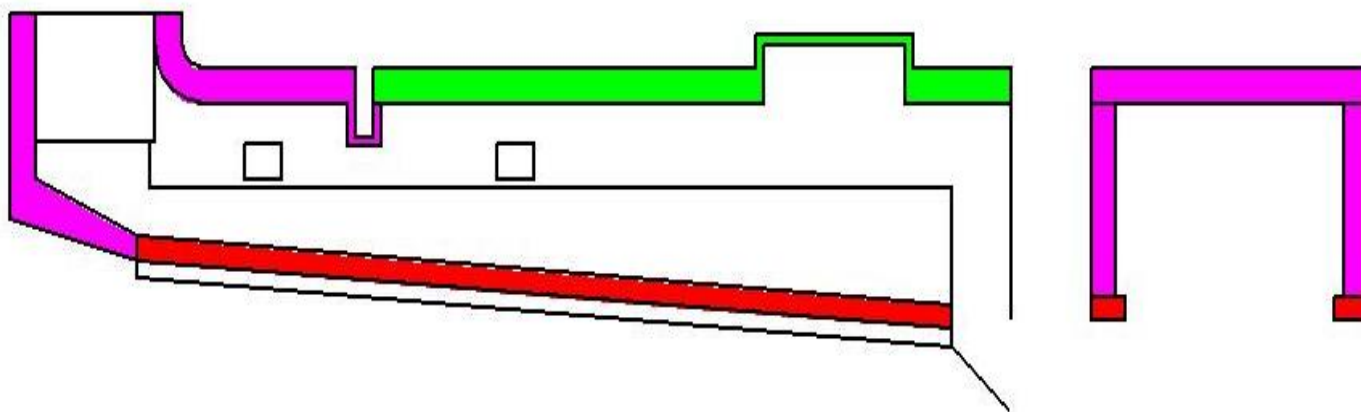
### LANCIA BRUCIATORE



LICOFEST KOR 94  
LICOFEST 42  
KEROFLOW T 04/7  
BAXOVIBRO VT 95 TAB

## COOLER

### RAFFREDDATORE

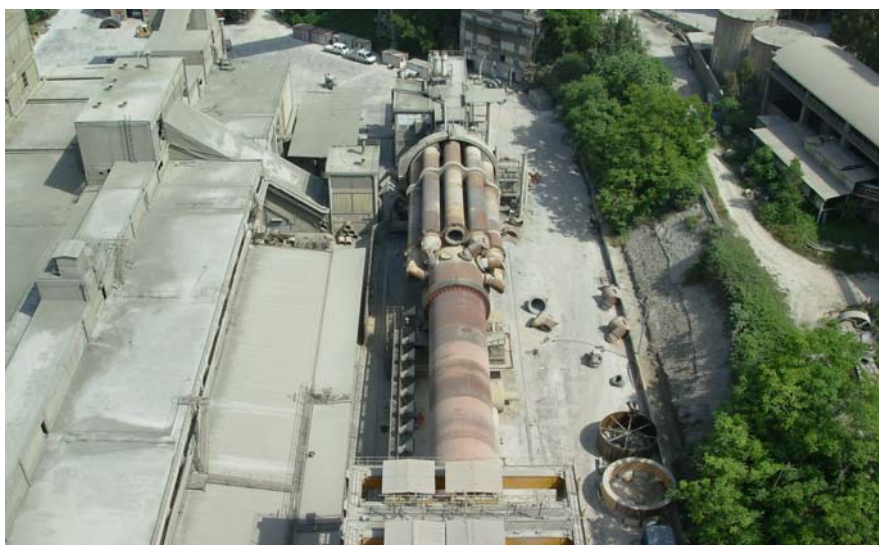


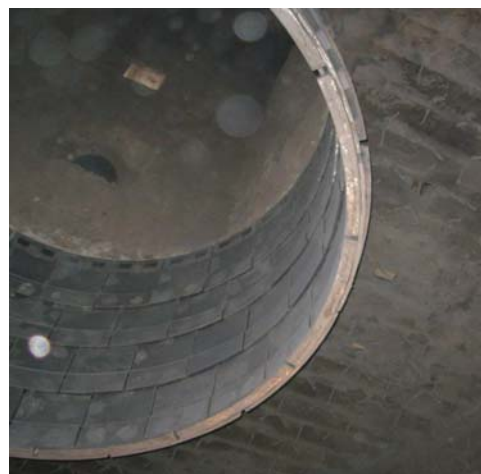
LICOFEST 1600 0-10 QH  
BAXOVIBRO LB  
BAXOVIBRO LB SIC  
BAXOVIBRO LB SIC 10  
LICOFEST 33 G TR  
LICOFEST 33 G SIC  
MAREF 62 C  
MAREF 72 C  
MAREF 80 C

BAXOVIBRO VT 336  
BAXOVIBRO VT 820  
BAXOVIBRO VT 1750

LICOFEST 28  
LICOFEST 37  
LICOFEST 1600 0-10  
BAXOVIBRO VT 336  
LICOFEST 32 G TR  
LICOFEST 33 G TR  
MAREF 42 C  
MAREF 44 C  
MAREF 52 C











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